RTCA Special Committee 186, Working Group 5

ADS-B UAT MOPS

Meeting #6

Input on Random Address Generation

Presented by Chris Moody, Mitre Corp.

SUMMARY
This paper proposes text for insertion into the draft MOPS on generation of random, self assigned addresses. This proposal includes a few minor changes to surrounding text in the document to help draw a distinction between permanent addresses (the 24 bit ICAO address in the case of aircraft) and temporary addresses (those that are self assigned based on a pseudorandom address generation procedure. This terminology seems more technically precise than the term anonymous since a temporary address may or may or may not be "anonymous" to ATC depending on policy. This paper is in fulfillment of Action Item 4-5, which was assigned at the Salem meeting.

1.0

2.0

2.1

2.2

2.2.1

2.2.2

2.2.3

2.2.4

2.2.4.1

2.2.4.1.1

2.2.4.1.2 Address Qualifier

The Address Qualifier is a 4-bit field that indicates the type of address being communicated in the Aircraft Address field. The various Address Qualifier values are defined in Table 2.2.4.1.2 below.

Table 2.2.4.1.2. Address Qualifier Codes.

Address Qualifier	Address Type	Reference Section
0	Permanent own-ship ICAO 24-bit aircraft address	
1	Temporary own-ship self-assigned “anonymous” address	
2	ICAO 24-bit aircraft address of TIS-B target.	
3	Surface Vehicle	
4	Fixed ADS-B Beacon (“parrot”)	
5-15	(Reserved)	

2.2.4.1.2.1 Address Qualifier Equal Zero (0)

If the Address Qualifier equals zero (AQ=0), the Aircraft Address field shall hold the ICAO 24-bit address that has been permanently assigned to the particular airframe.

2.2.4.1.2.2 Address Qualifier Equal Zero (1)

If the Address Qualifier equals one (AQ=1), the Aircraft Address field shall hold a temporary self assigned address.

2.2.4.1.2.3 Address Qualifier Equal Two (2)

If the Address Qualifier equals two (AQ=2), the message is a TIS-B message and the Aircraft Address field shall hold the ICAO 24-bit address that has been assigned to the target aircraft being described in the message.

2.2.4.1.2.4 Address Qualifier Equal Three (3)

If the Address Qualifier equals three (AQ=3), the Aircraft Address field shall hold the address of a Surface Vehicle.

2.2.4.1.2.5 Address Qualifier Equal Four (4)

If the Address Qualifier equals four (AQ=4), the Aircraft Address field shall hold the address of a Fixed ADS-B Beacon, commonly referred to as a “parrot.”

2.2.4.1.2.6 Address Qualifier Equal to Values between Five and Fifteen

If the Address Qualifier equals any value between five (AQ=5) and fifteen (AQ=15), the Aircraft Address shall be considered as “reserved” for future expansion.

2.2.4.1.3 Aircraft Address

2.2.4.1.3.1 Interpretation in Received Messages

This field shall be interpreted based on the Address Qualifier field as detailed in Section 2.2.4.1.2.

2.2.4.1.3.2 Generation of Temporary Address

If the Address Option is selected as “temporary”, then the “Aircraft Address” subfield shall contain a randomly generated number per the procedure below. This procedure is to be applied only at the time of unit startup or change of state of the Address Option input to “temporary”.

Let $ADDR_P$ be the permanent 24-bit ICAO aircraft address. Let M(1) and M(2)be the 12 LSBs of the latitude and longitude fields (in ADS-B reporting format) respectively at the time of startup or change of state of the Address Option input to "temporary". Define the 24-bit number

$$M(3) = 4096 * M(1) + M(2)$$

If a permanent 24 bit address is available, the temporary 24 bit address shall be the modulo 2, bit-by-bit summation of the permanent address and M(3); i.e.,

$$ADDR_T = ADDR_P \oplus M(3)$$

If a permanent 24 bit address is not available, time shall be used as the additional randomizer. Let TIME be the number of seconds elapsed since UTC midnight at the time of startup or change of state of the Address Option to "temporary". The temporary 24 bit address shall be the modulo 2, bit-by bit summation of Time and M(3); i.e.,

$$ADDR_T = TIME \oplus M(3)$$

If Time is not available, then the temporary 24 bit address shall equal M(3)